ETSO-2C514a
Date: 21.2.2018

European Aviation Safety Agency

European Technical Standard Order

Subject: AIRBORNE SYSTEMS FOR NON REQUIRED TELECOMMUNICATION SERVICES (IN NON AERONAUTICAL FREQUENCY BANDS) (ASNRT)

1 - Applicability

This ETSO provides the requirements which airborne systems to be installed on aircraft for non-required telecommunication services (in non-aeronautical frequency bands) (ASNRT) that are designed and manufactured on or after the date of this ETSO must meet in order to be identified with applicable ETSO marking.

Note: An antenna alone without an ASNRT controller does not fall under this standard.

2 - Procedures

2.1 - General

Applicable procedures are detailed in CS-ETSO Subpart A.

2.2 - Specific

None.

3 - Technical Conditions

3.1 - Basic

3.1.1 - Minimum Performance Standard

Standards set forth in the Appendix 1.

3.1.2 - Environmental Standard

Equipment providing telecommunication services shall be tested in accordance with Appendix 1, Chapter 4 of this ETSO.

3.1.3 - Software

See CS-ETSO, Subpart A, paragraph 2.2.

3.1.4 - Airborne Electronic Hardware

See CS-ETSO Subpart A, paragraph 2.3.

3.2 - Specific

None.

3.2.1 - Failure Condition Classification

See CS-ETSO Subpart A, paragraph 2.4.

4 - Marking

4.1 - General

Marking is detailed in CS-ETSO, Subpart A, paragraph 1.2.

4.2 - Specific

The label shall indicate the communication system or network used.

5 - Availability of Referenced Document

See CS-ETSO, Subpart A, paragraph 3.

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APPENDIX 1

AIRBORNE SYSTEMS FOR NON REQUIRED TELECOMMUNICATION SERVICES (IN NON AERONAUTICAL FREQUENCY BANDS) (ASNRT)

1. GENERAL

PURPOSE AND SCOPE

This minimum operational performance specification defines the minimum performance expected from an airborne system to be installed on aircraft for non-required communication services in non-aeronautical frequency bands (ASNRT). The performance of specific equipment may be enhanced or superior to this specification, depending on the intended application and configuration.

Chapter 1 describes typical equipment applications and operational objectives and is the basis for the performance criteria specified in Chapter 2 and Chapter 3. Definitions essential to proper understanding of this document are also provided in Chapter 1.

Chapter 2 contains general design requirements.

Chapter 3 contains the minimum performance specification for the equipment, defining performance under standard operating conditions.

Chapter 4 prescribes the environmental test conditions which provide a laboratory means of determining the performance characteristics of the equipment under conditions representative of those which may be encountered in actual operations.

Chapter 5 specifies the performance of the equipment and gives guidance for the installation.

APPLICATION

Compliance with this minimum operational performance specification by manufacturers, installers and users is recommended as a means of ensuring that the equipment will satisfactorily perform its intended functions under the conditions normally encountered in routine aircraft operations.

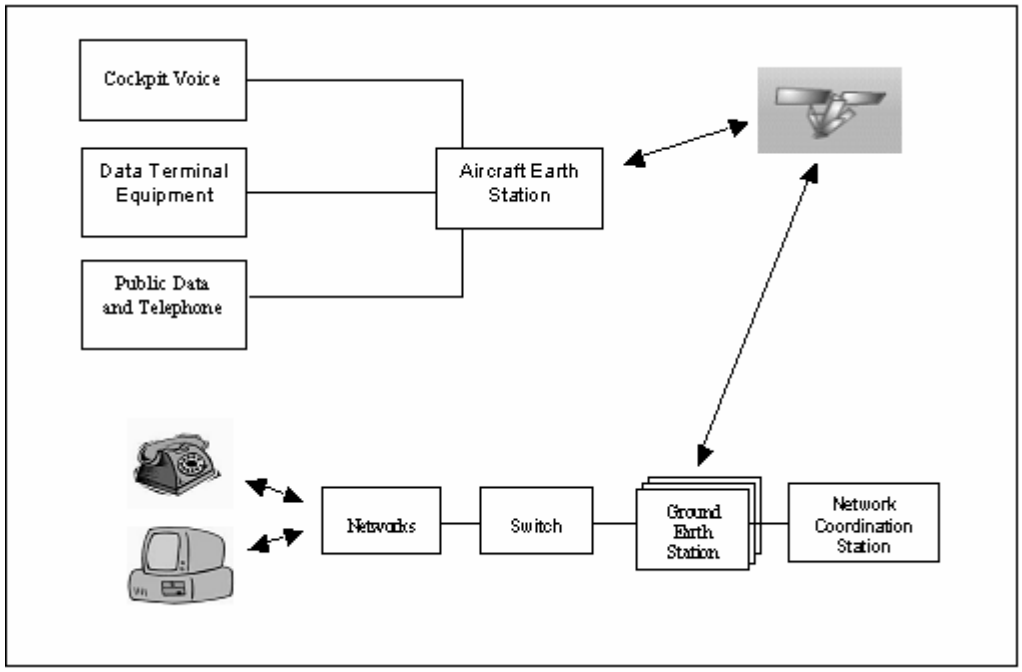
This specification does not cover telecommunication aspects. It is the responsibility of the manufacturer as well as the operator to obtain the necessary approvals from the responsible telecommunication authority and from the network provider, if applicable.

DESCRIPTION OF SYSTEM

The purpose of the airborne system for non-required communication services (ASNRT) is to provide flight crew and passengers with additional air- ground / air-air voice and data communication service. The system does not support safety-related applications like air traffic service (ATS).

It consists of electronic on board equipment which is not required for any phase of flight by any aviation rule. It is normally not connected to, nor interacts with, any aircraft system except the intercom, electrical power and mechanical mounting. In special cases, it may be useful to establish additional interfaces to other systems. Examples are communication management systems for transmission of data such as position, heading, etc. as well as company data. Furthermore, it might be useful to connect the ASNRT to devices serving as antenna steering units.

The following drawing shows an example of such a system utilizing the Iridium satellite network. It does not define a requirement.



Example Block Diagram:
Airborne System for Non-Required Communication Services using the IRIDIUM satellite network

2. GENERAL DESIGN REQUIREMENTS

AIRWORTHINESS

The equipment shall not, under either normal or failure conditions, impair the airworthiness of the aircraft in which it is installed.

OPERATION OF CONTROLS

None of the possible positions, combinations and sequences of the controls intended for use during flight shall result in a condition whose presence or continuation would be detrimental to the continued safe operation of the aircraft.

Operating the system shall not significantly affect the workload of the air crew.

The issuance of a radio or telecommunication station license in accordance with national regulations is mandatory. For non-aviation services which are not covered by EASA ETSOs, an European Norm (EN) standard is the appropriate definition for the transmission characteristic for a specific service in Europe. The EN applicable standard should be identified in the installation manual and DDP.

DESIGN CONSIDERATIONS

Controls and indicators intended for use by flight crew shall be of suitable design for the intended cockpit environment / philosophy (e.g. size, readability, illumination).

If an ASNRT equipment is integrated with a required A/C system, the ASNRT equipment shall not adversely affect the safety of the aircraft or its occupants, or the proper functioning of required equipment or systems under all foreseeable conditions.

EFFECTS OF TESTS

Unless otherwise provided, the design of the equipment shall be such that, subsequent to the application of the specific tests, no condition exists which would be detrimental to the continued safe operation of the aircraft.

AIRCRAFT EQUIPMENT INFORMATION VULNERABILITIES

If the equipment interfaces with aircraft busses and has connectivity to non-governmental services (e.g., Wi-Fi, Internet, etc.), the manufacturer may expose aircraft information vulnerability (such as cybersecurity risks) through equipment design, or become vulnerable as a result of being connected to a common interface. Therefore, it is important that manufacturers consider aircraft information security risk mitigation strategies in their equipment design, particularly when the equipment is responsible for an interface between the aircraft and aircraft-external systems.

It is recommended that manufacturers look at a layered approach to aircraft information security risk mitigation that includes both technical (e.g., software, signal filtering) and physical strategies. From a technical perspective, for example, this could include signal spoofing detection capabilities or more stringent, multi-factored authentication techniques such as passwords, PINs, and digital certificates. From a physical perspective, for example, such as in an in-flight entertainment system in the cabin, a manufacturer could consider connectors that require special tools to remove them to prevent passenger tampering. And finally, but just as important, manufacturers should consider supply chain risk management; for example, if a manufacturer is outsourcing software code development, are the contractor and its staff properly vetted?

Civil Aviation Authorities (CAAs) have a regulatory interest when an applicant's design makes use of a non-trusted connectivity where the installation can potentially introduce aircraft information security vulnerability. This requires the applicant to address not only the information security vulnerabilities and mitigation techniques for the new installation, but to also consider how vulnerability could propagate to existing downstream systems. Therefore, it is recommended that manufacturers reference their equipment aircraft information security review and mitigation strategies in the equipment's installation manual so that the applicant can consider them in meeting the installation regulatory requirements.

3. MINIMUM PERFORMANCE SPECIFICATION UNDER STANDARD CONDITIONS

GENERAL

The aeronautical system for non-required telecommunication services (ASNRT) must meet the basic requirement not to interfere with on-board systems.

It must be ensured that the equipment can neither become a source of danger in itself, nor threaten the proper functioning of any essential system or service.

Note: It is assumed that the manufacturer will also consult the telecommunication administration and (if applicable) the network provider as early as possible for approval of the technical parameters and requirements for the usage of the equipment.

SYSTEM SPECIFIC PARAMETERS

If appropriate, the manufacturer shall define details to show compliance with the 'GENERAL' subpart of this document.

A set of technical parameters showing that the system performs its intended functions shall be declared by the manufacturer. This set of data should include the quality, availability and reliability of the information channel and all the requirements which may be defined by the telecommunication administration or network provider for such equipment. However, when agreed by EASA, compliance demonstration is only necessary for a very basic requirement like 'communication link established'.

If the system interfaces to other on board equipment, compliance with the interface related requirements for that equipment has to be shown in order to exclude adverse effects on connected systems and the aircraft itself. In case of the intercom system electrical interface related parts of RTCA DO-214, or later revisions, (Audio Systems Characteristics and Minimum Operational Performance Standards for Aircraft Audio Systems and Equipment) Section 2.4 apply.

Means to disconnect the equipment from power bus or other systems (if applicable) shall be provided (i.e. Master Switch) for the case of unexpected interference, fire, smoke or other hazards.

Note: Compliance with this requirement can be achieved by the design of the equipment itself or by measures described in the installation manual.

CLASSES OF EQUIPMENT

There are two classes defined in accordance with technical means to ensure the proper operation of the equipment. There may be additional operational requirements which are not covered by this specification.

— Class 1: Equipment with the operation restriction to parked and (air-)

taxiing aircraft:

Technical means shall be provided to ensure that the equipment cannot be operated during other phases of flight (e.g. by connection to sensors for airspeed, weight on wheels, etc.).

Note: Equipment which can, due to interference problems, only be allowed to operate in a parked aircraft with engines and other systems switched off, is not in the scope of this specification.

— Class 2: Equipment for operation during all phases of flight:

The manufacturer shall obtain concurrence for the intended operation from the telecommunication authority or network provider (if applicable) before applying for an airworthiness approval.

4. MINIMUM PERFORMANCE SPECIFICATION UNDER ENVIRONMENTAL TEST CONDITIONS

INTRODUCTION

The environmental tests and performance requirements described in this chapter provide a laboratory means of determining the performance characteristics of the equipment under conditions representative of those which may be encountered in actual operations.

The airborne system for non-required telecommunication services in non-aeronautical frequency bands (ASNRT) needs to comply with environmental tests so far as it is necessary to ensure that the equipment cannot become a source of danger under environmental conditions.

Some of the tests contained in this chapter are identified with the phrase ’if required’. They do not have to be performed unless the manufacturer wishes to qualify the equipment to these additional environmental conditions or if requested by EASA.

Unless otherwise specified, the test procedures applicable to a determination of equipment performance under environmental test conditions are specified in ETSO-2C514 paragraph 3.1.2.

EQUIPMENT PERFORMANCE COMPLIANCE

The performance requirements as defined in chapter 3 are not required to be tested under all of the conditions specified in CS-ETSO Subpart A paragraph 2.1.

When exposed to high temperature and/or pressure as well as a power input and voltage spike test, it shall be ensured that there is no risk of fire, smoke or similar induced by the equipment.

During all shock and vibration tests, the equipment shall remain in its mounting and no part of the equipment or its mounting shall become detached and free of the shock test table.

Direct lightning tests for antennas or other equipment to be mounted outside the aircraft are only intended to ensure that a lightning strike is already blocked at the antenna itself and cannot influence other installations or the aircraft itself.

PERFORMANCE TESTS

The equipment is sorted into two categories. Category 1 is for devices which are to be installed inside the aircraft, e.g. in the avionics bay. Category 2 covers subsystems to be installed outside, especially antennas.

EUROCAE ED-14 / RTCA-DO160 Test	Section	Category 1	Category 2
Temperature and Altitude	4	+	+
Temperature Variation	5.0	-	-
Humidity	6.0	-	-
Operational Shocks and Crash Safety	7.0	+	+
Vibration	8.0	+	+
Explosion Proofness	9.0	-	-
Water Proofness	10.0	-	-
Fluids Susceptibility	11.0	-	-
Sand and Dust	12.0	-	-
Fungus Resistance	13.0	-	-
Salt Spray	14.0	-	-
Magnetic Effect	15.0	+	+(1)
Power Input	16.0	+	-
Voltage Spike	17.0	+	-
Audio Frequency Cond. Susceptibility	18.0	-	-
Induced Signal Susceptibility	19.0	-	-
Radio Frequency Susceptibility	20.0	-	-
Emission of Radio Frequency Energy	21.0	+	+(1),(3)
Lightning Induced Transient Susceptibility	22.0	-	-
Lightning Direct Effects	23.0	-	+(2)
Icing	24.0	-	-
Electrostatic Discharge	25.0	**+**	**+**
Fire, Flammability	26.0	**+**	**-**

+ mandatory test
- if required
(1) active antenna only
(2) This test can be omitted if compliance with the requirement is ensured by other means
(3) non intended radiation

The tests marked with 'if required' may become mandatory in case of specific technical reasons. This shall be agreed with EASA.

Note: The table above is based on ED-14G / DO-160G. When test conditions or test levels are revaluated, CS-ETSO requires compliance with ED-14G / RTCA-DO160G or later revisions as endorsed by CS-ETSO paragraph 2.1.

5. INSTALLED EQUIPMENT PERFORMANCE

The material contained in the following paragraphs is intended as guidance material only and does not have direct significance in the type certification of the equipment concerned. The aircraft installation must comply with the applicable airworthiness requirements and needs to be agreed by EASA.

EQUIPMENT INSTALLATION

Special care should be taken in selecting the antenna installation location in relation to other receiving and transmitting RF systems. A non-interference demonstration is required. Aircraft lightning zones and system lightning protection have to be determined. Additionally, for satellite systems, a free sight to the sky is necessary for good system performance. Covering the antenna by structural elements will directly influence the installed communication performance. The interface to the on-board intercom or other systems shall be installed in a manner so that a malfunction of the communication system does not cause conditions which prevent the safe continuation of the flight. The equipment shall be installed in accordance with the manufacturer's installation instructions.

If the ASNRT equipment contains a memory retention device which is a rechargeable lithium battery, the flammability risk must be addressed. Installed ASNRT equipment employing a rechargeable lithium battery must ensure the lithium ion battery meet airworthiness standards appropriate for the battery size and intended function.

OPERATING RESTRICTIONS

All operation restrictions which are defined e.g. by the rules of telecommunication authority and/or network provider should be enforced by technical provisions and procedures stated in the installation manual as well as the operation manual.